

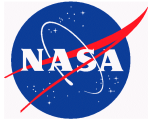
## **University Projects : Developing Students into Experienced Professionals.**

### **My Background:**

- BS Aerospace Engineering, CU Boulder, 1993. Mechanical team lead of a Shuttle Small Payload.
- MS Aerospace Engineering, ASU, 1996. Co-founder and project manager of ASUSat 1.
- JPL System Engineer (Section 313), 1996-2000. Delivered several flight instruments.
- Currently the Mars Exploration Rovers Payload Project Element Manager (Section 387), and a PhD Student at USC.

### **University Hands-on Projects provide students with the following:**

- The opportunity to apply their textbook training to real-world applications.
- An introduction to real-world design trades and decision processes.
- An end-to-end example of project phases including concept, design, build, test & operations.
- An exposure to real-world problems including project communications, documentation, design pitfalls, workmanship errors, and others.
- Exposure to Space Environment issues related to materials and testing.
- An opportunity to actually work on space flight hardware with their own hands.
- Many more benefits.

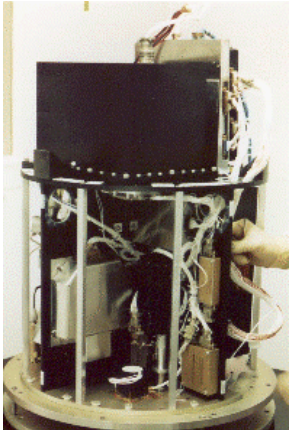
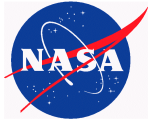


**University Hands-on Projects provide NASA & Industry with the following:**

- Trained students with experience in a real space program.
- A fresh look and new solutions to many engineering problems.
- Ideas on streamlined organization and new practices and procedures for small aerospace engineering projects.
- Possible space platforms for testing and providing flight heritage of new technologies.

- All of the above can be accomplished for a significantly low cost.

**The following pages provide some comments on my experiences with University Projects in cooperation with Government and Industry.**



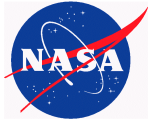
SUVE, STS-56

- University of Colorado, Boulder 1989-1993.
  - Get Away Special Payload- Solar Ultra-Violet Experiment (SUVE)
    - Experiment : 1/4m Spectrograph, 1/8m Spectrometer, Pentax Camera w/ H-Lyman-alpha filter, all for EUV measurements of Sun.
    - NASA Space Grant Intern, Mechanical Team Leader.
    - Launched: April 8, 1993.
- **First exposure to an aerospace project, to the subsystems involved, to applying FEA to a real structure, to submitting CAD drawings for machining, to science instrument requirements, and to the processes and complexities of launching space hardware.**
- Hundreds of students have had similar experiences with CU Space Grant Projects.
- Colorado Space Grant Program, CU - Elaine Hansen.

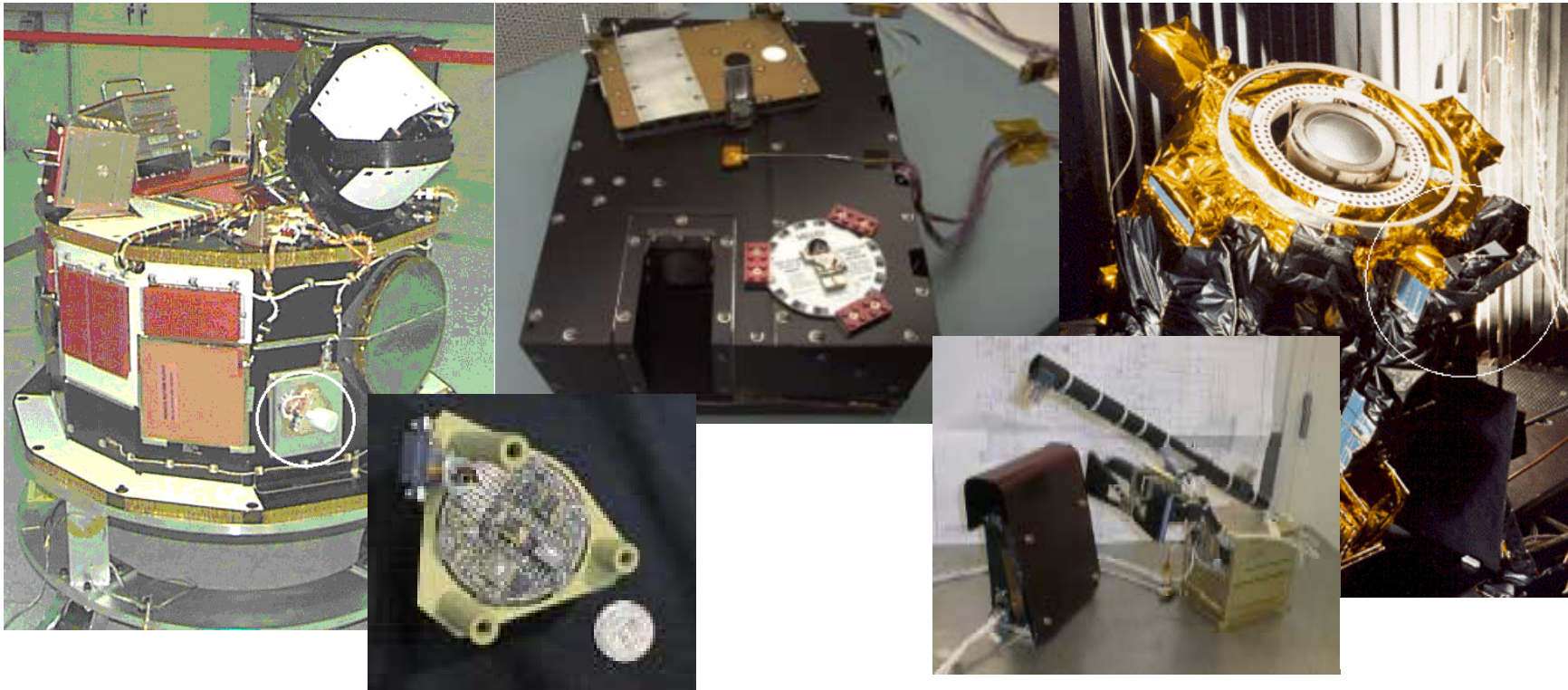


ASUSat 1

- Arizona State University, Tempe 1993-1996.
  - Co-founded ASUSat 1; Program Manager and System Engineer for 3 years.
  - Launched: January 26, 2000.
- **First exposure to project organizational aspects including team-building, schedule and resource planning, configuration management, and more.**
- **The goal of building a 10 pound satellite required innovative approaches and unique solutions to design problems.**
- Hundreds of students have had similar experiences with ASU Space Grant Projects.
- Arizona Space Grant Program, ASU - Dr. Helen Reed.



- JPL Senior System Engineer (Section 313) of the Mars Environmental Compatibility Assessment Instrument, the Plasma Wave Antenna on DS-1, the APS Imager instrument on STRV-2, and several mission and instrument proposals.
- **Many JPL Project experiences have been similar to University Project experiences.**
- **Experiences at CU and ASU prepared me well for JPL.**







## Workforce Development & University- Government Partnerships

• Currently the Mars  
Exploration Rovers  
Payload Project  
Element Manager  
(Section 387),

and a PhD Student at  
USC

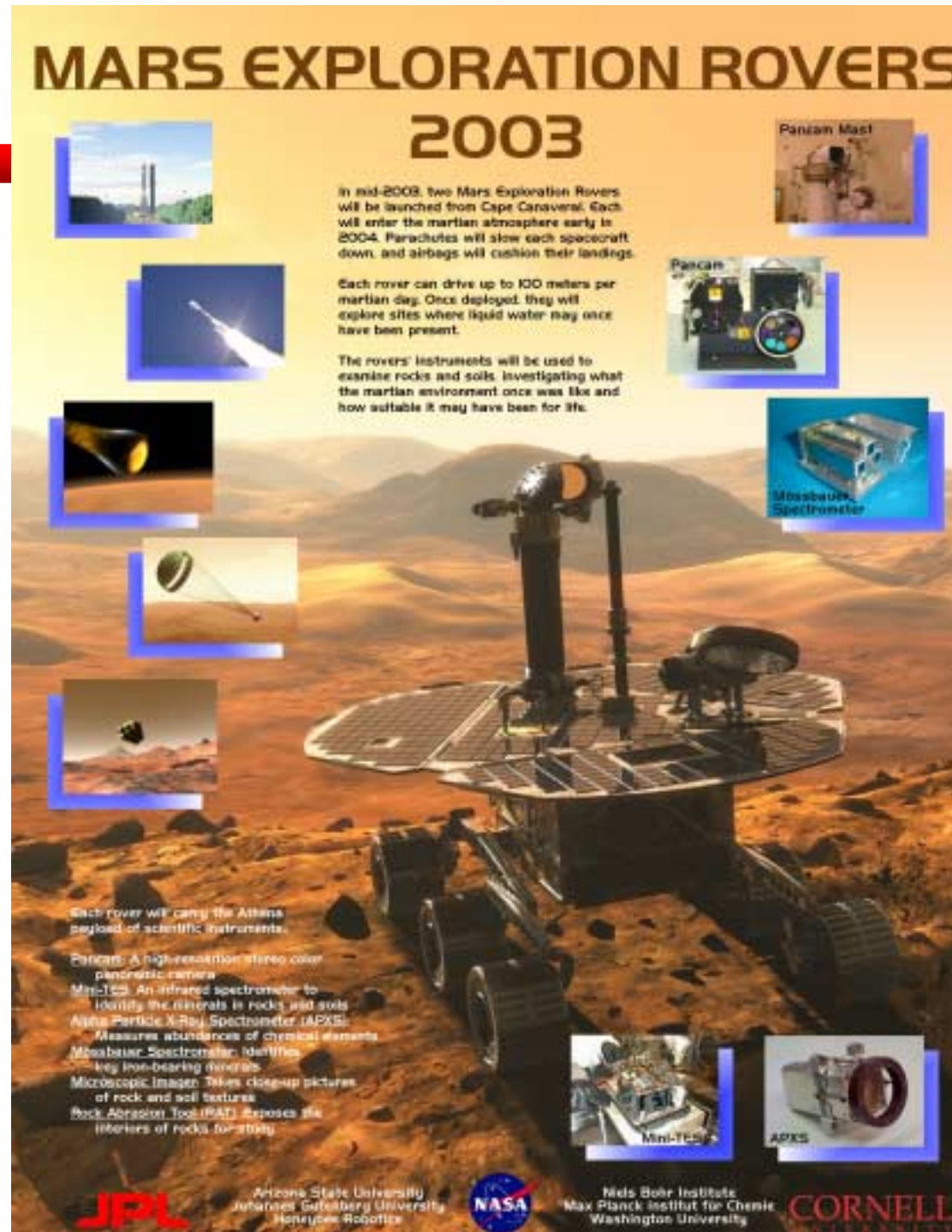
(Research Area:  
Modeling Flight  
Instrument  
Conceptual Design  
Using Intelligent  
Agents).

# MARS EXPLORATION ROVERS 2003

In mid-2003, two Mars Exploration Rovers will be launched from Cape Canaveral. Each will enter the martian atmosphere early in 2004. Parachutes will slow each spacecraft down, and airbags will cushion their landings.

Each rover can drive up to 100 meters per martian day. Once deployed, they will explore sites where liquid water may once have been present.

The rovers' instruments will be used to examine rocks and soils, investigating what the martian environment once was like and how suitable it may have been for life.



**PanCam Mast**

**PanCam**

**Mossbauer Spectrometer**

**Mini-TES**

**APXS**

Each rover will carry the Athena payload of scientific instruments:

- PanCam:** A high-resolution stereo color panoramic camera
- Mini-TES:** An infrared spectrometer to identify the minerals in rocks and soils
- Alpha Particle X-Ray Spectrometer (APXS):** Measures abundances of chemical elements
- Mossbauer Spectrometer:** Identifies key iron-bearing minerals
- Microscopic Imager:** Takes close-up pictures of rock and soil textures
- Rock Abrasion Tool (RAT):** Exposes the interiors of rocks for study

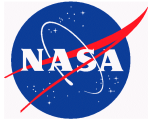
**JPL** Arizona State University  
Johannes Gutenberg University  
Honeywell Robotics

**NASA**

**Max Planck Institute for Chemistry**  
Washington University

**CORNELL**  
UNIVERSITY





**Disclaimer: This page lists my personal opinions of what could be done to make University-Government & University-Industry Partnerships even better. These opinions are my own and do not necessarily reflect the views or opinions of JPL, Caltech, or NASA.**

- Space Access:
  - Coordinate secondary payload launch opportunities across multiple launch platforms.
  - Develop additional secondary payload launch capabilities on future launch vehicles.
  - Continue to support and promote existing capabilities (Shuttle, Delta 2, OSP, and Others).  
(Ref: Worldwide Secondary Payload Launch Capabilities Report, Rademacher, 1999.)
- University Satellites as NASA & Industry Technology Platforms.
  - Award a Launch and ~\$2M to a competitively selected University or University Consortium each year for a microsat technology platform.
  - The University could provide a small spacecraft platform for selected NASA and Industry small instruments or small technology demonstrators.
  - It would provide flight qualification for many technologies such as MEMs, micro-gyros, micro-propulsion, APS imagers, and many others.
- University technology demonstration payloads on large missions.
  - Carve out a small volume and other resources on future NMP, Mars, and other large NASA missions.
  - Make the resources available to a University student experiment/technology demo.
- Many other possibilities.